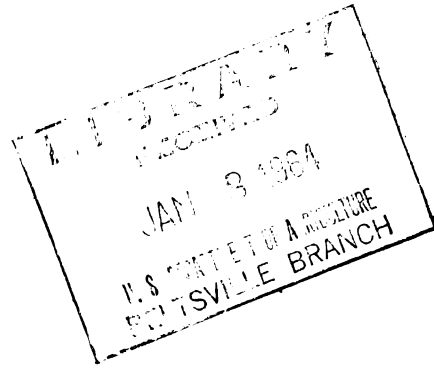




# **VETERINARY SERVICES IN NATIONAL EMERGENCIES**

Agriculture Handbook No. 255

Agricultural Research Service  
U. S. Department of Agriculture



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Prepared in cooperation with  
United States Department of Defense  
United States Department of Health, Education, and Welfare  
and the  
Council on Veterinary Service  
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# VETERINARY SERVICES IN NATIONAL EMERGENCIES

Of more than 21,000 doctors of veterinary medicine in the United States, some two-thirds are engaged in private practice. The remaining one-third are employed in government, education, research, and commercial activities.

The veterinary profession contributes its skills and knowledge at the Federal level by serving in the Department of Agriculture, the Department of

Defense, and the Department of Health, Education, and Welfare.

There are 18 colleges of veterinary medicine in the United States. Most State universities have a veterinary science department with a teaching and research staff, and more than half of the State universities employ Extension Service veterinarians.

## GENERAL PROBLEM

Emergencies and disasters have occurred many times in the past—and will continue to occur in the future. They can be produced by man or by Nature. They can happen while man is enjoying a peaceful existence. They always accompany war.

Many emergencies call for veterinary participation, which might include emergency care and treatment of humans, some public health services, epidemiological requirements, sanitary supervision, food inspection, and livestock protection and treatment.

In addition to providing professional services during natural disasters, the veterinary profession should be prepared to face the complex problems brought about by the use of nuclear, biological, and chemical weapons of modern warfare. To cope with these weapons would require all the technical and professional knowledge and ability that can be made available.

Modern warfare, like disease, is no respecter of persons, boundaries, or localities. It can strike anywhere and can affect anyone. Cities, rural communities, farms, and ranches can be the target, directly or indirectly, in any future war. Entire cities might be destroyed. Casualties might be counted in millions.

Veterinary medicine can contribute materially in any emergency. The basic responsibility of the veterinarian is to safeguard man's health by protecting his livestock and animal food products from loss due to disease or contamination. This must include disease prevention and control pro-

cedures, and protective and remedial measures required to guard against radioactive contamination. The veterinarian's responsibility includes meat and food inspection to assure that foods of animal origin are safe and wholesome. The veterinarian has a major role on the research team in conducting essential research upon which these protective programs are based, and in organizing efforts to carry them out effectively.

In all these activities, the veterinarian is so trained that he can add significant skills and services in either a peacetime or a wartime emergency.

In any emergency the first instinct of man or animals is *self-preservation* or *survival*, followed by *recovery* or *rehabilitation*. In case of nuclear attack, man is concerned with the immediate or direct means of protecting himself from the blast, heat, and radiation. In case of biological and chemical warfare, he is concerned with protection against the effects of the disease agent and the action of modern war gases. He would also have to cope with the delayed effects from these weapons.

In the event of nuclear attack, the first effect would be the destruction of property and the human injuries, including the severe traumatic mutilations resulting from blast and heat. Radiation hazards of fallout would soon follow. In case of biological warfare, there would be communicable diseases to check. There might be an increase in all types of disease, both in animals and in man, resulting from the disruptions of war and the discontinuance of orderly control services.

Also important to our survival would be an adequate and safe food supply readily available.

Civil defense authorities have stated that with proper preparation the Nation will have a much better chance to survive the initial emergency period. If we survive the first period, then we must face the second period—rehabilitation and recovery.

To accomplish these objectives, we must be informed and understand the threats from these special weapons, the problems they produce, methods of protection and treatment, and the means of minimizing their effects.

## HUMAN CASUALTY AND FIRST-AID SERVICE

The survival problem following a national emergency would include the care of large numbers of injured persons and larger numbers of evacuees whose homes have been destroyed or whose home areas have been made uninhabitable by exposure to nuclear radiation. Veterinarians in urban areas would have an initial responsibility to help physicians care for human casualties. This assistance would be especially necessary immediately after an attack in which the number of casualties would overwhelm the available medical personnel. At such time every medically trained person in the area would be needed. Veterinarians, when requested under local disaster survival plans, could provide first-aid skills, furnish medical and surgical supplies, and assist in many allied professional medical duties.

The casualties resulting from a multimegaton attack on this country would put an impossible strain on the surviving physicians. A high percentage of the hospitals might be destroyed, being in urban target areas. And lost with these hospitals would be crucial staff—physicians, nurses, hospital administrators, pharmacists, and other valuable paramedical persons.

Therefore, the surviving professional people would have to be utilized to the maximum. Their peacetime knowledge and skills would be used as a basis for expansion. Subject to the extent of regional damage, the remaining physicians would be optimally utilized as supervisory persons. Under the direction of surgeons wherever possible, other physicians, dentists, nurses, veterinarians, sanitarians, and various health professionals would undertake *expanded function*, according to

Emergency activities for veterinarians would include: (1) Assistance in human casualty and first-aid service; (2) radiological defense; (3) biological warfare defense; (4) chemical warfare defense; (5) public health services; and (6) food inspection, including monitoring for radioactive, bacterial, and chemical contamination, with remedial measures where possible.

It must be emphasized that emergency responsibilities should include the necessary steps to assure the veterinarian's own survival so that he will be able to perform the many services he can contribute, in an enlarged degree, during an emergency.

the American Medical Association's Summary Report on National Emergency Care. (See app. A.)

If no physician is immediately available, the highest qualified paramedical persons present would assume responsibility. Therefore, considerable orientation and expanded function training must take place, under proper medical supervision. It is further presupposed that the so-called Good Samaritan Law will have been passed by State legislatures so that professional paramedical people can function under legal safeguards while performing their disaster roles. (See app. B.)

To minimize the loss of hospital plants and equipment in such an attack, Civil Defense Emergency Hospital (CDEH) units are being placed in selected sites throughout the country. These CDEH units have 200-cot capacity and are equipped to provide emergency surgico-medical care for several days. Newer models will have sufficient supplies to carry on emergency surgery and medicine for several weeks. A certain number of CDEH's have been designated at training units. Within these CDEH setups, in expansions of existing hospitals, and in other substitute facilities, the surviving physicians will be augmented by their paramedical comrades into the maximum possible medical force.

The value of the diversified and often extensive supply of drugs and equipment in many modern veterinary hospitals should not be overlooked. Also, many of these establishments are outside of but peripheral to target areas, increasing their usefulness and survival potential. They should be considered in any area medical plan.

## EMERGENCY TRAINING

All the foregoing emergency care would be possible only through preplanning and—even more important—adequate preattack training. Schools of veterinary medicine would do well to develop special training courses in disaster medicine.

Expanded function training should not be confined, however, to schools of veterinary medicine. Across the entire profession, competencies should be sharpened, updated, and enlarged to enable veterinary medicine to become a full-fledged member of the emergency medical team.

Some idea of the services that will be expected from veterinarians may be outlined as follows:

### **A. Radiological Defense**

1. Nuclear weapons effects
  - a. Strategic
  - b. Tactical and ecological
  - c. Biological (including role in host-agent disease relationships)
2. Radiation orientation
  - a. Types
  - b. Detection
  - c. Countermeasures
  - d. Salvage
    - (1) Human
    - (2) Animals, foods, byproducts
    - (3) Areas, crops, material, structures
    - (4) Disposal of radioactive matter

### **B. Biological Warfare Defense**

1. Methods of overt and covert introduction, limitations and uses.
2. Effects on—
  - a. Animals
  - b. Foods

c. Humans

d. Ecology.

3. Epidemiological methods (using for course material the most likely biological warfare agents and most serious endemic disease types, including animal, zoonotic, and human).
4. Recognition of pathogens and rapid identification methods (as in No. 3).

### **C. Chemical Warfare Defense**

1. Types of agents and their limitations.
2. Methods of employment.
3. Effects, both group and area, human, animal, and food.
4. Recognition and countermeasures.
5. Damage control and decontamination.
6. Salvage, animals and food.

### **D. Food Inspection**

Intelligent evaluation of the immediate and future needs of the population versus radiological, chemical, biological, and/or other occurrences that may have affected foods. (Foods to be defined as ante- and/or post-mortem animals, poultry, fish, plants, packaged or stored products or byproducts, including dairy products, eggs, crops, and potable or processing water.)

### **E. Environmental Sanitation**

Veterinary participation in insect and rodent control, water treatment, wastes and sewage disposal, should be voluntary and limited to immediate problems connected with parts A through D.

## PUBLIC HEALTH SERVICES

Emergency defense plans must include preparations to prevent death from striking the remaining population because of communicable and noncommunicable diseases, lack of water, radiation exposure, and many public health problems that would arise from emergency concentrations of large groups of displaced persons. Emergency movements and concentrations of displaced persons would pose many public health and sanitary

problems in rural areas where these people may be placed. The veterinarian, with his medical background, his knowledge of the health conditions of livestock in the area, and his understanding and knowledge of the requirements for a safe environment, can provide much needed epidemiological and supervisory service in these areas. (See app. A, p. 9, item 13.)

## **RADIOLOGICAL DEFENSE**

The veterinarian can be extremely helpful to farmers and livestock owners in regard to radiological defense. He can provide information, leadership, and guidance in measures to protect livestock from the effects of radioactive fallout and to minimize the contamination of animals and poultry food products.

Where possible, the veterinarians will assist in determining the methods of handling or disposing of exposed animals, recommending either: (a) immediate slaughter for food; (b) destruction and sanitary disposal; (c) isolation for further ob-

servation; or (d) release as relatively nonaffected animals. (See app. C for further details.)

The limiting factor for survival after a nuclear attack may well be man and not the animal. The use of animals and animal byproducts for food may reduce the hazard of radioactive contamination below that which must be tolerated if food is obtained directly from plants. Although total body irradiation and intestinal doses from absorbed isotopes will be much higher for animals than for man, their relatively faster maturity and reproductive cycle will compensate for some of the ill effects produced by the increased radiation.

## **BIOLOGICAL WARFARE DEFENSE**

Biological warfare (BW) is the intentional use of disease-producing agents or their toxic products to cause death, disability, or damage to man, animals, or crops. The ultimate target is man, either by causing his sickness or death, or by limiting his food supplies or other essential agricultural resources.

Biological warfare may find its greatest effectiveness when used for antifeed purposes. Contrary to the case in antipersonnel BW, the epiphytotic and epizootic potentials of anticrop and anti-animal agents could be exploited by an enemy. Antifeed BW could play a decisive role in any war not conducted with pushbutton speed.

The various animal diseases that might be effective biological warfare agents against the livestock and poultry of our country include such domestic diseases as anthrax, hog cholera, and Newcastle disease. The majority of potential biological warfare diseases include those now foreign to this continent, such as foot-and-mouth disease, rinderpest, African swine fever, Rift Valley fever, and fowl plague.

Veterinarians and inspectors of meat and other animal food products may be the first to see the initial indication of biological warfare. (See app. D for additional information.)

## **CHEMICAL WARFARE DEFENSE**

The scope of chemical warfare is broad. It is directed at groups rather than single individuals. Chemical warfare agents could be used to produce casualties, make areas impassable, start fires, and contaminate food and water. The contamination

of animals, food, and water with chemical agents could be incidental to the attack on a primary target. (Additional information is contained in app. E.)

## **MEAT AND POULTRY INSPECTION**

Meat and poultry inspection becomes extremely important following a disaster. This inspection activity is an important adjunct to preventive medicine to help assure the consumer that the meat and poultry products he eats are safe and wholesome; that they are free of contamination from potential biological warfare agents, chemical warfare agents, and radioactive fallout. Poultry and meat inspection serves also as an alerting mecha-

nism in detecting irregular disease patterns in the food animal population.

The utilization of Federal, State, and municipal meat and poultry inspection services must be planned. The veterinary practitioners, both small-animal and general, may be called upon to provide the supervisory services required in carrying out this program.

## PLAN FOR ANIMAL CARE

Since the veterinarians will be required to help care for human casualties during the initial stages of an emergency, programs for the care and handling of animals during this period should be so organized that they can be conducted by the Animal Rescue League or similar organizations.

All animal protective organizations have offered their cooperation and the use of their facilities to local civil defense directors. A close working arrangement among all local groups is imperative, in the interest of people and animals too. In communities where there are several animal protective groups, a coordinated plan for joint action should be developed to avoid duplication of effort.

Experience in England during World War II

revealed that far fewer animal casualties occurred in air raids than were expected. One of the big problems seemed to be in caring for stray animals after a bombing. Because of the risk of starting epizootics, animals could not be merely rounded up and housed in temporary centers; therefore, a number of detention posts were used.

In the early raids on London, many dogs and cats were made homeless. In a few days, packs of hungry and starving dogs became dangerous, even taking possession of evacuated homes. Cats were intentionally left behind in some areas to keep down rats and mice. However, most animals were rounded up after each raid and sent to a detention post until they were claimed or destroyed.

## NATIONAL GOVERNMENT AGENCIES

### Department of Defense

The Department of the Army and the Department of the Air Force both have veterinary services as an integral part of their medical services. The veterinary service conducts inspections on all foods of animal origin purchased by the Armed Forces to insure that no diseased, unsanitary, or unsound foods are procured for or issued to troops. The role of military veterinarians, physicians, dentists, and other allied health professionals is determined by the military disaster plan for the area in which they are stationed. However, reserve personnel of all categories may be utilized on a voluntary basis until called to military duty.

### Department of Agriculture

Executive Order 10998, signed by the President on February 16, 1962, assigns emergency preparedness functions to the Department of Agriculture. These functions include the following:

The Secretary of Agriculture . . . shall prepare national emergency plans and develop preparedness programs covering: . . . defense against biological warfare, chemical warfare, and radiological fallout pertaining to agricultural activities . . . . These plans and programs shall be designed to develop a state of readiness in these areas with respect to all conditions of national emergency, including attack upon the United States.

*Biological, chemical, and radiological warfare defense functions.* Develop plans for a national program, direct Federal activities, and furnish technical guidance to State and local authorities concerning (1) diagnosis and strengthening of defensive barriers and control or eradica-

tion of disease, pests, or chemicals introduced as agents of biological or chemical warfare against animals, crops, or products thereof; (2) protective measures, treatment and handling of livestock, including poultry, . . . any of which have been exposed to or affected by radiation. Plans shall be developed for a national program and direction of Federal activities to assure the safety and wholesomeness and to minimize losses from biological and chemical warfare, radiological effects, and other emergency hazards of livestock, meat and meat products, poultry and poultry products in establishments under the continuous inspection of the U.S. Department of Agriculture . . . .

The Department of Agriculture has veterinary services in both the Agricultural Marketing Service (AMS) and the Agricultural Research Service (ARS).

The Agricultural Marketing Service provides the veterinary inspection service for poultry and poultry products in federally inspected plants.

The Agricultural Research Service conducts research relating to: (1) production and utilization of agricultural products; (2) protection of livestock and crops against diseases and insect pests; and (3) countermeasures that would reduce or remove radioactive materials from agricultural commodities. The veterinary regulatory programs conducted by ARS include: (1) animal inspection and quarantine; (2) animal disease control and eradication; and (3) Federal meat inspection.

During a national emergency, the facilities of ARS will be utilized for the protection of crops and animals against diseases, insect pests, and radioactive fallout.



## **Department of Health, Education, and Welfare**

Executive Order 11001, signed by the President on February 16, 1962, assigns emergency preparedness functions to the Secretary of Health, Education, and Welfare.

Various components of the Public Health Service of the Department of Health, Education, and Welfare are concerned with disease control. Among these are the Communicable Disease Center and the Divisions of Environmental Engineering and Food Protection, Air Pollution, Radiological Health, and Occupational Health, of the Bureau of State Services, and the National Institutes of Health, all of which employ veterinarians.

During a national emergency the veterinarians of the Department of Health, Education, and Welfare can be called upon when problems arise in their field. Some are particularly well qualified to make epidemiological investigations of disease

outbreaks; others are trained in detecting and combating biological warfare agents; another group is well qualified in detecting radioactive fallout; and others specialize in preventing milkborne and foodborne illnesses.

The Commissioner of Food and Drugs has the authority under this Executive Order delegated by the Secretary to plan and direct national programs for the maintenance of purity and safety in the manufacture and distribution of food, drugs, and biologicals in an emergency. During a national emergency, Food and Drug Administration veterinarians will furnish information and guidance on the safety for emergency use of feeds and veterinary drugs that may have been exposed to radiological, chemical, and biological warfare agents. Assessment of safety may also involve evaluation of safety and suitability of available veterinary drugs for human use on an emergency basis.

## **STATE GOVERNMENT AGENCIES**

### **State Departments of Agriculture**

The State veterinarian or State livestock sanitary official conducts animal disease control programs within his own State. He has his own organization and works in collaboration with the Agricultural Research Service and the veterinary practitioners of the State. In addition to his own livestock disease control organization, he can deputize and use veterinary practitioners throughout his State in animal disease control work. In some States this office directs the State meat inspection program. In plans for handling a national emergency, the State and local civil defense organizations should look to the State veterinarian and his staff for appropriate help.

### **State and Local Departments of Health**

Most State health departments employ public health veterinarians. The State public health

veterinarian is primarily interested in developing appropriate methods to protect man against those animal diseases that are transmissible to man. The normal peacetime cooperation between the public health veterinarian, State livestock authorities, and the veterinary associations and veterinary institutions will be extremely useful during a national emergency. As a member of a State civil defense health office, the State public health veterinarian can provide information and guidance on the State civil defense program and the utilization of the veterinary practitioner during an emergency.

Many local health departments employ veterinarians as meat inspectors, milk and food sanitation specialists, and in the control of the zoonotic diseases. These veterinarians are also readily available in case of national disaster.

## **VETERINARY ASSOCIATIONS**

The State and local veterinary associations should contact and work with the appropriate State and local civil defense organizations, as well as the State veterinarian, to become aware of the defense organization and objectives, and the proposed plan for utilizing their services. If this

information is available, it should be provided to members of the associations. The civil defense organization should look to the veterinary associations for guidance and information on utilizing veterinary medical capabilities.

## PRACTITIONERS

### General Practitioners

General practitioners in rural areas are almost wholly concerned with the prevention and control of animal diseases, both of an economic and of a public health interest. The results of such efforts affect to a great extent the health and welfare of the Nation.

During a national emergency, peacetime activities of disease prevention and control would continue and would be extended. In case of a possible biological warfare attack, all available veterinary personnel would be expected to help cope with the situation.

### Small-Animal Practitioners

During a national emergency and especially after the bombing of a city, the small-animal practitioners can be helpful and will be expected to

help provide medical aid to the many human casualties that will result from these attacks. Medical and nursing help and facilities may be overwhelmed completely. The small-animal practitioner, with his hospital facilities, can provide professional skills to help care for such casualties.

After the emergency, small-animal practitioners may be needed to aid in providing an inspection service for foods that may have become contaminated during a bombing attack, and for food-processing plants that may have been partially destroyed or contaminated. The veterinarians' professional skill may prevent disease and sickness caused by the consumption of spoiled, deteriorated, or contaminated foods. Supervision over preventive measures and sanitary measures necessary in handling and processing these foods for human consumption can be provided by veterinarians in urban areas.

## DEFENSE ORGANIZATION WITHIN THE DEPARTMENT OF AGRICULTURE

The Department of Agriculture has a country-wide defense organization directed from Washington by a Special Assistant to the Secretary. The Special Assistant is advised and assisted by the USDA National Defense Board, consisting of the heads of those agencies having major defense responsibilities.

There are eight defense regions of the Office of Emergency Planning and the Office of Civil Defense, Department of Defense. Preemergency liaison activity at the regional OEP-OCD offices will be conducted by USDA national headquarters.

A USDA State Defense Board has been established in each State. The Chairman is the State Executive Director of the Agricultural Stabilization and Conservation Service except in Alaska. His staff consists of representatives from the Department agencies with major defense responsibilities. Veterinary representation from the Agricultural Research Service is found on each USDA State Defense Board.

The Department's defense organization extends into each county through USDA County Defense Boards. Because the Agricultural Research Service does not usually have personnel regularly assigned to the county level, the information on protection of livestock is obtained from the USDA State Defense Boards.

The veterinary practitioner can receive information on the USDA emergency programs from the Veterinarian-in-Charge of the Animal Disease Eradication Division, usually located in the State Capitol, or from the USDA Defense Board Chairman located, in most cases, at the ASCS State and county offices.

However, it is suggested that the veterinarian work closely with the local civil defense organization on the local program. Information on the State civil defense program can be obtained from the State veterinarian and the veterinarian in the State health department.

## APPENDIX A.—DISASTER TRAINING OBJECTIVES

As proposed by the American Medical Association in "Summary Report on National Emergency Care," issued in 1959, the disaster training objectives for veterinarians are essentially as follows:

In view of the anticipated disparity between the number of casualties and the number of available physicians after a mass attack on the United States, as well as the number of injuries amenable to competently administered self-aid and first-aid treatment, it is imperative that: (a) all physicians and osteopaths, regardless of their special qualifications, receive training and become proficient in the practice of disaster medicine; and (b) dentists and veterinarians receive training and become proficient in the practice of disaster dentistry and disaster veterinary medicine, respectively, and receive such additional training in disaster medicine as will enable them to take effective lifesaving and first-aid measures and to perform functions that will assist the medical profession.

The American Medical Association expects that the professional medical associations of the United States, including State, county, and city medical societies, will actively encourage and take the lead in supporting such approved professional and technical training programs as may be designed to insure the medical preparedness of the Nation for an all-out war. It further expects individual physicians to assist, advise, and conduct training sessions when requested; demonstrate leadership in the field of disaster medicine; and insure adequate and proper instruction of the general public.

It is imperative that additional functions be performed under mass casualty conditions by persons other than physicians, not only to relieve physicians, but also to insure that the fullest possible use is made of all available personnel. The employment of nonmedical health personnel to perform additional functions, *after adequate preparation and training*, is essential and practicable under mass casualty conditions.

Casualties will receive more adequate care if physicians can be relieved of those functions which others can be trained to perform. Members of the

allied health professions are capable of being trained to perform in those capacities under general medical supervision.

### Functions of Health Personnel, Including Veterinarians

1. First-aid including, but not limited to, artificial respiration, emergency treatment of open chest wounds, relief of pain, treatment of shock, and the preparation of casualties for movement.
2. Control of hemorrhage.
3. Attainment and maintenance of patent airway and intratracheal catheterization, including tracheotomy.
4. Proper and adequate cleansing and treatment of wounds.
5. Preparation and application of bandages and splints.
6. Administration of anesthetics under medical supervision.
7. Assistance in surgical procedures.
8. Insertion of nasogastric tubes including lavage and gavage, as directed.
9. Administration of whole blood and intravenous solutions, as directed.
10. Administration of parenteral medications, as directed.
11. Catheterization of males and females.
12. Administration of immunizing agents, as directed.
13. Sanitation including waste disposal; examination of water sources, methods of water treatment and distribution; milk sources, methods of sterilization and distribution; and inspection of foods including detection of radioactive contamination.

### Sorting of Casualties

To further reduce the awesome discrepancy between casualty caseload and available medical aid, the concept of sorting or triage has been borrowed from the military. In brief, this consists of a grading system, by means of which incoming casu-

alties are sorted into three major groups, immediately prior to hospital admittance:

Priority I. Those needing outpatient care.

Priority II. Moderately injured and ill who can be saved or restored to usefulness by immediate definitive treatment.

Priority III. Injured and ill whose treatment can be delayed (a) without undue harm, and (b) critically injured and ill requiring too great an expenditure of time or material, and those beyond help.

Thus, by training and functioning in this expanded capacity, the doctor of veterinary medicine helps to fill the immediate medical needs in his area. By utilizing the concept of sorting, the discrepancy between the number of patients and of available medical personnel is further reduced.

### Treatment Principles

Certain principles apply particularly in the treatment and management of mass casualties during the emergency phase after an attack.

It is imperative that these principles, in addition to such others as may be appropriate, form the basis for—

(a) The early management of mass casualties, and

(b) Instructional material for training in mass casualty care.

It is recommended that the following treatment principles, in addition to such others as may be appropriate, be promulgated through inclusion in any national emergency medical plan and training publications prepared and distributed by the Federal Government in connection with preparations for a mass attack.

If maximum care is to be provided to the greatest number of mass casualties under emergency conditions that are expected to prevail following an all-out attack, it is imperative that—

1. Treatment procedures in disaster and support areas be simplified and standardized.

2. The control of hemorrhage, the attainment and maintenance of a patent airway, and the treatment of shock—the critically essential lifesaving measures—receive the highest priority at all levels.

3. During the emergency period following a mass attack on the United States, no treatment procedure be performed that renders a casualty less able to care for himself.

4. Treatment procedures be designed to preserve life over limb and function over appearance.

5. Casualties requiring only self-aid, first-aid, or outpatient care be treated as indicated in disaster or support areas, whereas admission to hospitals must be reserved for more seriously ill patients.

6. Psychologically disturbed individuals not be admitted to hospitals treating the injured.

7. No patient be removed from his litter or improvised stretcher until he has reached a place of definitive treatment or removal is otherwise essential.

8. Similar types of cases be grouped to the extent practicable to simplify, standardize, and expedite treatment.

9. Medical laboratory procedures be held to the absolute minimum.

10. X-ray examinations be held to the absolute minimum.

11. Blood typing of casualties be carried out before transfusion, and crossmatching also be carried out, if practicable.

12. Casualties be transferred to convalescent facilities or discharged and treated on an outpatient status as early as possible.

### Narcotics

In the use of narcotics, it is imperative that—

1. Morphine and other narcotics not be issued to rescue workers, litter bearers, ambulance drivers, or others of like category for use on casualties.

2. Morphine and potent opium derivatives be administered only in medical treatment facilities by qualified personnel.

3. In the treatment of injured personnel, morphine be used only for the purpose of relieving severe pain. Since major wounds frequently are almost painless, there is no indication that morphine should be administered solely because of the presence of such wounds.

4. Morphine or other potent narcotics not be administered to casualties exhibiting signs of traumatic or hemorrhagic shock.

5. Morphine or other respiratory depressants not be administered to casualties with head injuries, severe chest injuries, respiratory depression, or distress.

6. The smallest effective doses of morphine be employed.

7. The dosage of morphine, the hour, date, and route of administration be entered on the medical records of those casualties who receive it.

## Personnel

Following a mass attack on the United States, it is imperative that—

1. Every able-bodied survivor with knowledge or skill in a health field be utilized to the full extent of his knowledge and capabilities in an appropriate medical or health activity.

2. Medically trained personnel not be utilized in rescue or other nonmedical operations.

3. The most adequate round-the-clock staffing possible be provided for medical installations to enable personnel engaged in the care of the sick and injured to obtain adequate rest in order that they may work at top speed, employing sound medical judgment, over periods of time as long as weeks or months.

4. Physicians, osteopaths, dentists, and veterinarians, as well as other health personnel who require a license to practice in their home States or territories, practice without a license in any area which requires their services in the care of mass casualties.

5. Members of the recognized health and medical professions practicing the healing arts in the care of mass casualties in the United States be immune from professional liability suits brought by such casualties or their relatives.

## Carrying Out of Emergency Plans

*A. General.*—Emergency plans will be put into operation at all levels upon declaration by the President that a civil defense emergency exists, or in the event of attack before such declaration. They may be activated in whole or in part under less demanding circumstances in a particular area or areas, upon direction of duly constituted authority in such area or areas.

*B. Public.*—Immediately after an attack, individuals, families, and groups will aid themselves

and each other until locally organized health forces start functioning.

*C. Local.*—Immediately upon attack or declaration of emergency, local governments, which are the primary sources of effective health services, will perform their functions with resources on hand until outside aid from other localities or the State or Federal government becomes available.

*D. State.*—As promptly as possible following attack or declaration of emergency, the State will evaluate the total health situation and assume responsibility for executive emergency health plans within the State.

*E. Federal.*—When State resources are insufficient to provide required health services, the Federal Government will augment them as soon as possible with Federal health resources not required for emergency activities of the Federal Government. In the event a State government is unable to act, the Federal Government will assume responsibility to the extent necessary to provide the best possible health services to the surviving population in the particular area or areas.

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## APPENDIX B.—DISASTER AND THE VETERINARIAN'S LIABILITY

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What duty does a veterinarian owe to his clients when conditions beyond his control make it impossible for him to render his usual service? The answer is based upon the same principles of contract, bailment, and negligence that apply in all such situations, and there is a considerable accumulation of legal doctrine surrounding this subject. Let us examine the probable application of this doctrine by posing a number of specific situations.

### **Destruction or Partial Destruction of an Animal Hospital**

Certainly the veterinarian is not liable for loss of animals or injury to animals in his custody immediately resulting from a bombing, fire, explosion, or other cause beyond his control. But if there are surviving animals, he would then owe the owner the duty of providing such care and taking such steps as would be reasonable to preserve the lives and health of such animals. This duty might be discharged in a number of ways—placing the animals in another hospital, finding temporary quarters, notifying owners and asking them to take the animals. If X-ray and other equipment essential to the treatment of animals is destroyed, then there would be no liability for failure to conduct such treatments until such time as the veterinarian could, with reasonable alacrity, make arrangements for their continuation. The veterinarian's legal duty might be altered considerably by the application of civil defense rules. If, for example, he is required to look after human patients, his duty to animal-owner clients would be discharged by leaving the animals with the best kind of help he is able to find and notifying owners of the situation. Even the duty to notify would be altered by the destruction of communication facilities—telephones, highways, vehicles, the local press. Countless factual situations can grow out of disaster, so that it is impossible to rationalize

all of them. For example, what is the duty of the veterinarian—

to recapture escaped animals?

with respect to the spread of disease by escaped animals?

to sheep owners whose sheep are killed by escaped dogs?

to people who are attacked by escaped animals?

for damage caused by the negligent acts of the employees or agents he procures to look after the animals?

If we were to coin a rule or guide, it might say, "The veterinarian in charge of an animal hospital is not liable to animal owners or the public generally in case of disaster, so long as he moves with reasonable speed to take the next logical step to protect the interests of both." As we have already indicated, this next logical step will depend on a number of variables and cannot very well be predicted in advance. Some of the steps will be covered by civil defense rules, but even these cannot allow for all contingencies.

### **Death or Incapacity of the Veterinarian**

The veterinarian's death would ordinarily terminate any liability against his estate arising out of his failure to care for patients. Likewise, he would be relieved of liability if he were seriously injured and could not make arrangements for followup. If he is able to attempt to make arrangements by telephone or through members of his family or other agents, there would be some duty on his part, but it might not extend beyond seriously ill animals for which he knows some arrangements must be attempted. If he has one or more uninjured partners, then of course the partnership is still liable for "carrying on," and the immediate responsibility would devolve on his partners. If he has an animal hospital and animals in his custody, then his employees would be

expected to protect the animals unless they are likewise excused by circumstances beyond their control.

### **Destruction of Veterinary Facilities**

Since veterinarians are not legally bound to accept cases, the decision to accept no more following destruction of their offices, supplies, and equipment is clearly within their right. But they would still owe a duty to clients whose animals they were attending at the time of the disaster. As indicated under situation 1, their duty will depend on what they are able to do through reasonable efforts. If they cannot find a vehicle to use, they would not be negligent in failing to follow up on a sick animal 10 miles distant from their place of business. Here, again, the law will have to rely on a "rule of reason" and perhaps our statement about "taking the next logical step" in view of particular circumstances and possibilities is as close as we can come to answering the question—"What is the veterinarian's duty to his clients in case of a disaster?"!

### **Treatment of Human Patients**

It is the obvious intent of both the Federal and State laws in case of emergency to provide for the

care of patients and casualties by other than the professional people who would ordinarily care for them.

Veterinarians, dentists, laboratory technicians, biologists, anyone with some special knowledge of physiology or medicine, would be expected to take over roles in preference to a layman with no learning or special knowledge of any kind. This, of course, will raise questions about negligence, malpractice, degree of skill and care, and other subjects which in normal times could very well become the basis for lawsuits. Certainly, the presence of such an emergency and the policy of both State and Federal Governments would go a long way toward excusing the nonprofessional in the care of human patients. For want of a better generalization, perhaps one could say such care is justified and would not be subject to action of any kind as long as professional care is not available for patients and casualties requiring attention, and the person in attendance is not wanting in the skill of his calling and is not careless or negligent. Conceivably, this could be for quite a long period if the number of casualties is great and all the professional people in medicine are needed to take care of the most serious cases and to man emergency hospitals and other units.

## APPENDIX C.—RADIOLOGICAL DEFENSE FOR LIVESTOCK AND THEIR FOOD PRODUCTS

Farm animals, like man, are susceptible to radiation damage (table 1). Hazards to livestock and subsequently to man, who depends upon livestock as a source of food, are of two types. One is the external hazard from the gamma-emitting fallout particle, and the second is the internal hazard resulting from the contaminated food, air, and water ingested by livestock and man. For example, animals grazing on contaminated pasture or consuming contaminated feed and water may ingest some 200 different radioactive isotopes that are found in fallout particles. Among these isotopes are cesium 137, which is chemically similar to potassium and would be found in the soft tissues of the animal; strontium 89 and strontium 90, which are chemically similar to calcium and concentrate in the bones and are secreted in the milk of dairy animals; and iodine 131, which concentrates in the thyroid gland and is secreted in the milk of dairy animals. These radioactive isotopes constitute an internal hazard to man, who consumes the meat and other animal food products, particularly milk.

Therefore, livestock first must be provided shelter during and after fallout to protect them from

the external radiation hazards from gamma rays. Shelter provided by a barn will give some protection from this hazard. Secondly, a shelter will help protect feed and water from fallout contamination. The important objective is to try to prevent the radioactive material (fallout) from becoming incorporated or mixed with the feed and water and thus prevent ingestion of harmful quantities of radioactive material.

### Shelter

The value of shelter in preventing death and sickness among animals is greatest in areas exposed to acute radiation doses about equal to the average midlethal dose (550 roentgens). At low radiation intensities, there is little beneficial effect from shelter because no animals would become sick or die whether sheltered or not. At high intensities of outdoor radiation, however, all animals would die whether sheltered or not.

Table 2 indicates the percentage of mortality that might be expected among various species of sheltered and unsheltered animals exposed to different intensities of radiation. This information should be considered as a general guide of expected mortality based on current knowledge, and not as a forecast of exact mortality rates.

The objectives of providing shelter for livestock and poultry are: (1) to protect livestock from the lethal effects of radiation, thereby conserving an important food resource; and (2) to protect the feed and water of food-producing animals from radioactive contamination, thereby assisting the production of safe food products for human consumption. After the first critical 24 to 48 hours or when outdoor work periods can be scheduled, livestock can be given short periods of exercise in areas or yards that do not contain contaminated vegetation or water. When it is no longer practical to keep animals off contaminated pasture, supplemental feeding with uncontaminated feed should be provided as far as possible.

TABLE 1.—*Percentage of mortality of unsheltered animals after 24-hour exposure to various radiation doses*

[Values from dose rate experiments with constant intermediate radiation exposure]

Species	Mortality				
	100 Per- cent	80 Per- cent	50 Per- cent	20 Per- cent	0
	Exposure dose (roentgens) <sup>1</sup>				
Cattle.....	650	600	550	450	300
Sheep.....	700	600	525	450	350
Swine.....	800	700	600	450	350
Poultry.....	1, 200	1, 100	900	600	400

<sup>1</sup> Exposure dose in area where livestock and building are located.



TABLE 2.—*Effect of shelter on the mortality rate of livestock*<sup>1</sup>

Kind of livestock and radiation exposure—unsheltered dose (number of roentgens—1 day)	Mortality rate by nature of shelter			
	No shelter	Tight wooden barn (protection factor of 2)	2-story barn with loft full of hay (protection factor of 5)	Basement-type barn with loft full of hay (protection factor of 10 or more)
Cattle:	Percent	Percent	Percent	Percent
500-----	30	0	0	0
1,000-----	100	30	0	0
3,000-----	100	100	80	0
Hogs:				
500-----	30	0	0	0
1,000-----	100	30	0	0
3,000-----	100	100	50	0
Sheep:				
500-----	38	0	0	0
1,000-----	100	38	0	0
3,000-----	100	100	80	0
Poultry:				
500-----	10	0	0	0
1,000-----	64	10	0	0
3,000-----	100	100	20	0

<sup>1</sup> The reduction of radiation by shelter is described as the "fallout protection factor." For example, if the fallout protection factor of any given structure is 2, then the intensity of outside radiation is reduced by one-half. In fallout areas, one-half or more of the radiation would be released after the end of the first day.

Food animals which have received radiation doses that may result in sickness or death may not show any injury within a period of 2 to 10 days after exposure.

### Reducing Iodine 131 Contamination of Food and Dairy Products

On the premise that the radioactivity from iodine 131 largely disappears from materials after a 60-day period, the dairy farmer can confine lactating animals to the barn before the appearance of fallout in the area and provide forage and feed that had been harvested before the detonation or stored for at least 60 days after exposure to fallout. Freshly contaminated forage can be fed to nonlactating stock. Concentrated mixtures prepared on the farm should be made from grains harvested before the fallout or that have been stored for 60 days or longer. Ensilage that has

been stored for at least 2 months could also be a safe feed for dairy animals.

Confining dairy animals to reasonably dusttight buildings and providing them with clean, noncontaminated feed and water will aid greatly in minimizing the contamination of the dairy products from these animals.

### Feeding Dairy Cattle

As long as strontium 90 is descending, it will provide a surface contamination of crops and forage and may provide the principal source of radioactive materials in the feed of farm animals. As this source of contamination decreases, rations for dairy cattle can influence the strontium 90 content of milk. For maximum effect, one should in principle reduce plant calcium to a minimum and increase the mineral calcium to a maximum. For example, a diet of grass hay, corn, and inorganic calcium would provide less strontium for the animal than would a diet of legumes, such as clover, lespedeza, or alfalfa, which are good sources of calcium but which would also contribute a greater amount of strontium.

### Livestock Slaughtering

Food animals exposed to irradiation can be slaughtered and used for food if this is done within 2 to 8 days after exposure, or if they have recovered from the ensuing illness. Because of lowered resistance, infections may develop 7 to 14 days after exposure and be accompanied by a severe generalized illness. If this were the case, the animal would not be a suitable source of food. There is no evidence, though, that the flesh of lethally irradiated animals is harmful unless secondary infections have become established.

There is some concern with the slaughter of contaminated animals, however, aside from the effect of radiation sickness in the animal. We must be concerned with the transfer of radioactive material from the hide and intestinal contents to the meat surface during the dressing operation. And there is a danger to the person doing the dressing of skin burns from beta particles if he has prolonged direct contact with the hide or ingesta.

To meet these hazards it would be advisable to wash animals before slaughter, if possible. This would be especially recommended with swine because it would be relatively easy to wash them and would prevent an accumulation of radioactive

material in the scalding water. Detergents are particularly effective in removing radioactive material. Cattle washing should either be done thoroughly or not attempted at all because there is less transfer of contamination from hide to meat when dressing a dry animal than when dressing a partially clean wet animal. The washing of poultry or sheep is ill advised. However, a drying period before slaughter of any wet sheep is recommended.

Dressing operations should be done with full awareness that the butcher may develop painful, slow-healing beta burns if he is not protected from contaminated hides or ingesta. Rubber gloves, protective plastic coverings, masking tape, rubber aprons, and rubber boots would serve to protect him. Also, keeping these coverings clean as the work progresses would reduce the hazard.

When dressing animals contaminated with fallout, nothing but the eviscerated carcass, the cheeks, and the heart should be saved for food purposes. The remainder, including the hide or pelt, should be removed to a remote location.

### **Salvage of Contaminated Food**

Food inspection work done soon after an attack would probably be concerned with salvage of existing food stocks so that hunger would not necessarily add to the woes of the Nation. Food stocks may be damaged by blast, heat, or a number of contaminants, and decisions must be made as to whether the food is safe to deliver to the public. As a rule, Government food inspection services can make such specialized decisions, but there is a real possibility that a large attack would create such widespread disruption of the food industry that the existing force of inspectors would be too small to meet the problem in all areas. It is under these circumstances that the veterinary practitioner could provide additional service to his community.

The local veterinarian, in such circumstances, would be expected to examine the damage and release sound foods for distribution. If fallout were a problem in the area, he would be working with a man trained in radiological monitoring. The veterinarian's essential task, however, would be to determine if deteriorative changes had occurred to the extent that the food otherwise would be hazardous to consume.

The principle of salvage of contaminated or damaged food is to segregate the contaminated from the uncontaminated and to clean up the former, if possible. Often the radioactivity or damage will be located only on the surface of a stockpile, and by careful removal of the surface, containers may be uncovered which have suffered no damage or contamination. Such unaffected product would be released for immediate consumption. In the portion that must be decontaminated before use, trimming of meats, or the dusting or washing of containers with a detergent solution would remove much of the contamination. When the contaminating material is radioactive fallout, the contents of sealed, undamaged packages or containers will be free of activity.

Food products located in sealed and undamaged refrigerators or freezers usually will not be contaminated with radioactive fallout. With the breakdown of refrigeration, which is very likely in a damaged area, perishable product may be salvaged. If it has not been possible to use fresh meat immediately and bacterial damage is not too great, the food products may be washed or trimmed and then cooked thoroughly before eating.

Sterile canned products have a greater salvage potential than many other types of food have, are relatively resistant to physical damage, and can await the lapse of the denial time that must precede salvage in highly contaminated areas. Radioactive contamination can be removed from the surface of cans by a relatively simple washing process. The danger of nonpotable water or sewer contamination may be eliminated by washing the containers, dipping them in a chlorine solution, and drying. Canned foods must be carefully examined for rust spots; damaged stocks must be used promptly following washing. However, it would be well to incubate them first, if this is feasible. The incubation period is to permit identification and removal of incipient spoilage in progress due to rust spots that have perforated the can, seam rupture, etc., not apparent to the unaided eye. Obviously ruptured cans should be disposed of without delay. The absence of proper incubation temperatures may require prolonged holding if emergency conditions permit. Such decisions, however, must be based on the demand for food supplies and the calculated risk involved.

Glass containers will be especially subject to crushing and breakage. Radioactive material or contamination from polluted water easily lodges under screwcaps or friction-type lids and is difficult to remove.

It is not expected that many food-processing plants in attack or fallout areas would have sufficient power or raw material for preserving foods for some time after an attack. For this reason, it is vital that methods of preserving food at the farm or ranch be actively pursued if these products are to provide a source of protein in time of national disaster.

### Countermeasures

Countermeasures against fallout contaminants include those actions and procedures that would result in reducing or eliminating the exposure of the population to the hazards of radioactive materials. These procedures should be directed to the source of the contamination, to the mechanism that transmits it, or to the substance in which it gains access.

Countermeasures would be taken only after responsible authorities had carefully evaluated the situation and declared a state of emergency. The decision would not be an easy one. Medical assessment of the probable damage from radiation would have to be balanced against the cost of the decontamination measures, the resulting reduction in available food supplies, and the economic and social dislocations resulting from the action.

Countermeasures could be drastic, or they could involve changes in generally accepted farming practices. Some measures could be simply an improvement over local conditions and procedures. Some countermeasures could result in reducing the contaminant by only a small factor, but a combination of several of these measures could provide the necessary reduction.

Three major areas of research have been conducted by USDA toward developing countermeasure procedures that might be used to reduce radioactive materials in agricultural commodities. These are: (1) Removal of radioactivity in milk; (2) animal management systems which result in reduction of radioactive materials in animal food production; and (3) soil treatment to reduce radioactive materials in crops.

### Other Pertinent Information Available

Technical and semitechnical information of interest to veterinarians has been developed and distributed, such as the following.

[U.S.] AGRICULTURAL RESEARCH SERVICE.

1961. USDA RADIOLOGICAL TRAINING MANUAL. U.S. Dept. Agr., 232 pp., illus. (A technical publication providing useful information on the effects of radiation on livestock and the means of protecting livestock or minimizing radiation hazards.)

1962. PROTECTION OF FOOD AND AGRICULTURE AGAINST NUCLEAR ATTACK. U.S. Dept. Agr., Agr. Handb. 234, 41 pp., illus. (A semitechnical publication providing information on the protection of livestock and livestock food products against radioactive fallout. This handbook also provides suggested denial tables relating to iodine 131, strontium 90, and personnel protection. Mortality exposure tables on livestock also are included.)

1963. USDA RADIOLOGICAL MONITORING HANDBOOK. U.S. Dept. Agr., Agr. Handb. 246, 44 pp., illus. (A technical publication providing radiological monitors of the U.S. Department of Agriculture with information, procedures, and guidance in conducting emergency monitoring service.)

1963. DAMAGE TO LIVESTOCK FROM RADIOACTIVE FALLOUT IN EVENT OF NUCLEAR WAR. National Academy of Sciences Publication No. 1078, 93 pp. (A technical publication providing information on effects of external ionizing radiation on farm animals, internal exposure to gamma and beta rays, effects from ingestion of fission products, effects of contact with radioactive materials, and related subjects.)

Visual aids, including color-sound movies and filmstrips, together with lectures, are available for training and information. One of these is:

Film. "Fallout and Agriculture." 23 min., 16 mm., sound, color.

Available from: Film Libraries of State agricultural colleges; American Veterinary Medical Association, 600 South Michigan Ave., Chicago 5, Ill.; and Motion Picture Service, Office of Information, U.S. Dept. of Agriculture, Washington, D.C., 20250.

USDA veterinarians trained in radiological defense also can help in discussing these problems, as well as protective measures for livestock. Further information can be obtained from the Veterinarian-in-Charge, Animal Disease Eradication Division, in each State.

## APPENDIX D.—BIOLOGICAL WARFARE DEFENSE

Biological warfare against the livestock of this country would most likely include foreign pathogenic organisms. There are well-known diseases and parasitic infections that an enemy could use as potential weapons to attack our domestic animals as well as the human population. If our animals were left unprotected, an enemy using these weapons could destroy our livestock sufficiently in a few years to significantly reduce these essential agricultural resources.

In many diseases of animals, the cause and methods of transmission are well known and the measures needed for control have been established. The control and eradication of some diseases are relatively simple; of others, more difficult.

Some of these diseases are widely spread throughout the world today. Several have gained entrance into the United States and Canada in the past but were quickly stamped out. Some have never appeared within our country. Our livestock and poultry are susceptible to various exotic diseases because there is an absence of immunity either naturally or artificially acquired.

Those diseases capable of affecting both man and animals (zoonoses) have potential biological warfare characteristics. This group would include such diseases as anthrax, brucellosis, glanders, the various encephalitides, influenza, leptospirosis, Q-fever, Russian spring and summer fever, tularemia, Rocky Mountain spotted fever, psittacosis, and plague. For many of these diseases, eradication or control within the animal population is the only effective method of preventing human infection.

To carry out this responsibility, as in the peacetime programs for animal disease control, the Department looks to the entire veterinary profession for help and cooperation to assure an effective and successful program. (See USDA delegated responsibility, Executive Order 10998, p. 5.)

The vast countrywide State-Federal cooperative regulatory programs for the protection of livestock provide the basis for an emergency organization and the knowledge required to help com-

bat these potential threats. This same State-Federal combination, with its continued research developing new information and eradication procedures, provides important tools to help combat foreign diseases and pests.

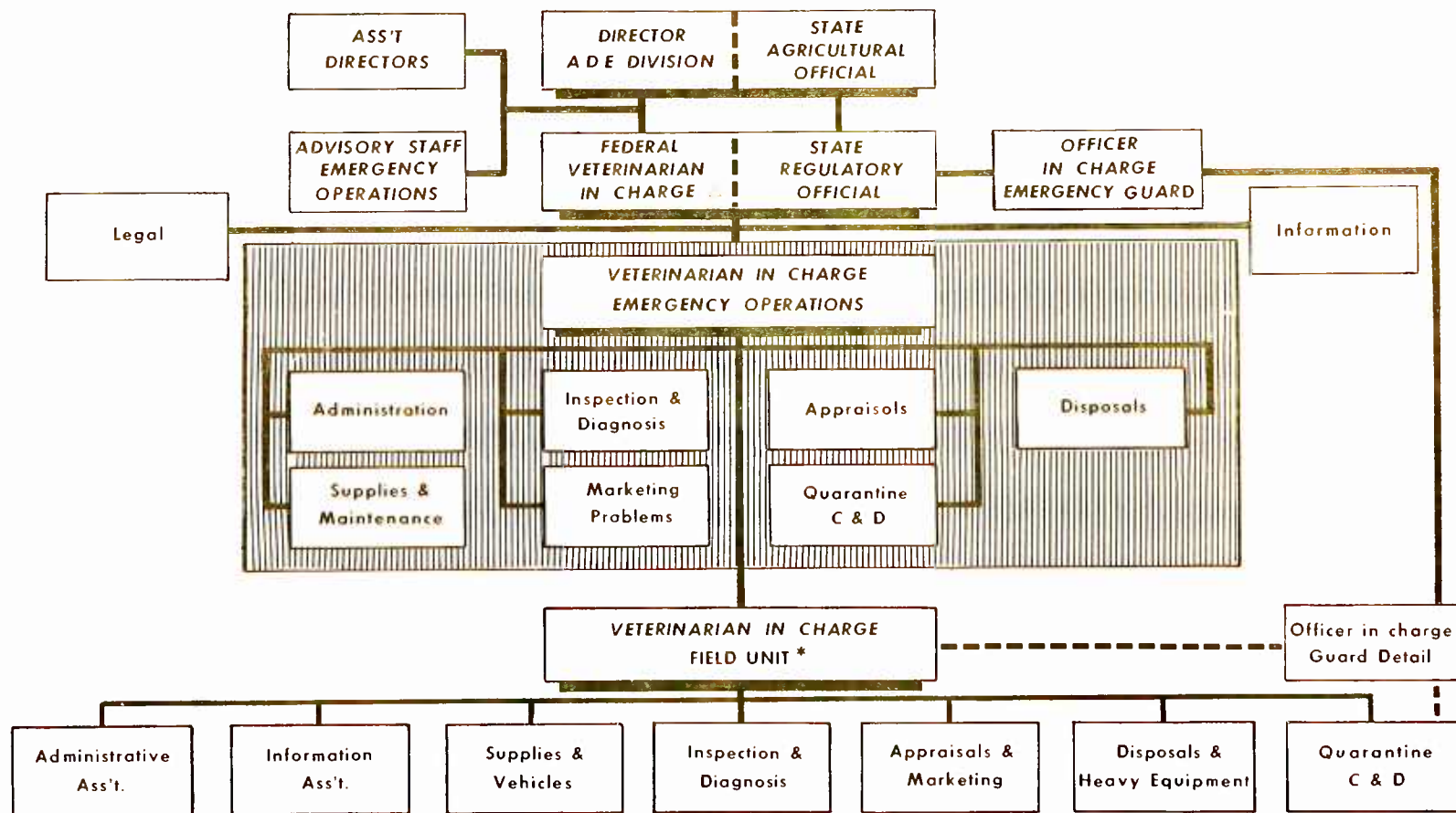
The State veterinarian and the Veterinarian-in-Charge of the Animal Disease Eradication Division are jointly responsible for the development and operation of this emergency program. In most States this emergency organization is on a standby basis. (See fig. 1.)

The important part in any program of this kind is the immediate reporting of any unusual disease of animals to the practitioner of veterinary medicine, or to the State and Federal officials responsible for the control of animal diseases. The speed with which these initial outbreaks are determined may mean the success or failure of control or eradication. The farmer or livestock owner has a responsibility in this protective program. He must continually conduct good animal husbandry practices and maintain preventive medicine precautions to protect the health of his livestock. He should report immediately any unusual conditions in his flocks and herds.

### Veterinary Practitioner's Responsibility

The local practitioner, with his experience and knowledge of the usual diseases and the normal incidence of disease in his community, will probably be the first person to realize that there is an unusual increase in the incidence of any disease or that a new type of disease is present. When unusual diseases or conditions are detected by the practitioner, he reports his suspicions to the State veterinarian immediately. In the case of vesicular diseases, such as foot-and-mouth disease, and other suspected foreign animal diseases, there are specially trained diagnosticians of the U.S. Department of Agriculture strategically located throughout the country who can be called to conduct the necessary investigations to establish the diagnosis and instigate the necessary quarantines and eradication or control measures.

# PROPOSED STATE-FEDERAL EMERGENCY DISEASE ERADICATION ORGANIZATION



△ UNDER USDA STATE DEFENSE BOARD DURING A NATIONAL EMERGENCY

\* ADDITIONAL FIELD UNITS AS NEEDED

U. S. Department of Agriculture

August 1962

Agricultural Research Service

FIGURE 1.—Organization for carrying out emergency disease eradication program.

## Information and Training Programs

The Department of Agriculture has prepared and distributed information on biological warfare as it would affect the livestock of this country. This includes information on specific animal diseases and insect pests that are looked upon as potential biological warfare threats. Short courses have been conducted throughout the country for professional and scientific personnel on identification, means of prevention, control and eradication.

Visual aids in the form of color-sound movies have been developed and are available from the film libraries of State agricultural colleges, the American Veterinary Medical Association in Chicago, and the Motion Picture Service, U.S. Department of Agriculture, Washington, D.C.,

20250. They show in detail the means of diagnosis, identification, effects, and control and eradication procedures.

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## APPENDIX E.—CHEMICAL WARFARE DEFENSE

Plans relating to chemical warfare defense assume that—

(1) Potential enemies have the capability of waging chemical warfare;

(2) Chemical warfare agents may be used against humans to produce death and illness, impede defensive actions, impair morale, reduce the will to exist, and minimize production capability either for the conduct of war or for recovery and rehabilitation; and

(3) Chemical warfare agents may be employed against food, drugs, animals, and crops, since long-term recuperative ability may be a decisive factor.

Based on the above assumptions, the following information on chemical warfare as it pertains to food, feed, and animals is presented.

### General

Unprotected food, forage, and grain supplies might be so contaminated that their consumption would produce gastrointestinal irritation or systemic poisoning.

Packaged food supplies in storage are not likely to be seriously contaminated. Canned foods are safe, but the outer surfaces of the containers should be washed with soap or a detergent and water before opening. Large supplies of food should not be condemned *en masse* simply because they have been exposed to the possibility of chemical contamination. They should be handled by only those persons trained in decontamination methods and equipped with proper protective clothing and gas masks.

Personnel handling animals contaminated with liquid nerve gas or vesicant agents must be protected by gas masks and impermeable protective aprons and gloves.

### Nerve Gas

Nerve gas symptoms in animals are: Difficult respiration, constricted pupils, and copious serous

nasal discharges. Speed is essential in treatment. An intramuscular injection of 2 milligrams of atropine sulfate may reduce casualties by as much as 50 percent. After the inhalation of nerve gas vapor, delay of 5 minutes in administration of atropine sulfate will greatly reduce its effectiveness. The injection may be repeated if the animal goes into convulsions or respiration becomes more difficult.

*Liquid nerve gas* on the animal's coat may penetrate to the skin both as vapor and liquid, and be absorbed fairly rapidly. Therefore, decontamination of the animal in the first few minutes is essential. The most effective method is to rinse the coat with a 5-percent solution of sodium carbonate, followed by water, then give an injection of 2 milligrams of atropine sulfate. If myosis is marked, atropine sulfate ophthalmic ointment should be inserted into the eyes until mydriasis is induced and maintained. Extreme care is required by those handling such animals or administering treatment.

### Blister Agents

Blister or vesicant agents produce inflamed or ulcerated areas on the animal's skin but not vesications. Since the coat impedes penetration, effective prophylactic measures may be instituted later in animals than in man. Decontamination may be accomplished by vigorous scrubbing of the contaminated area with a 5-percent solution of potassium permanganate. Swabbing with soap and water, or washing with solvents such as gasoline or kerosene is not advised because they usually spread the agent and cause a large shallow lesion.

It must always be remembered that the contaminated coat of an animal can transmit the chemical agent to any human who comes in contact with it.

Animals should not be permitted to drink from water holes or pools of water following a chemical attack or release. Water from deep wells or large streams and lakes, however, is usually safe.

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